

Quad-Core and Dual-Core Intel® Xeon® Processor 3000 Sequence-based Platforms

Entry-Level Servers with outstanding dependability, performance and value



Boost performance and energy efficiency with new 45nm multi-core Intel® Xeon® processors

Take your business to new levels with server platforms based on the Quad-Core and Dual-Core Intel® Xeon® processor 3000¹ sequence and the Intel® 3200 chipsets. Now featuring Intel's new 45nm next-generation quad- and dual-core processors based on Intel's enhanced core microarchitecture for entry-level servers that deliver a unique combination of trusted Intel® server technology and exceptional value for small businesses. Intel's enhanced core microarchitecture enables lower power consumption than previous generations of Intel® platforms based on Intel® Pentium® processors, resulting in lower operating costs and reduced fan noise. The faster 800 MHz DDR2 memory speed available with Intel 3200 chipset can offer higher performance than previous-generation Intel 3000 chipset.

Intel Xeon processor 3000 sequence-based entry-level servers are designed with utility and versatility in mind. They are ideal for small business owners looking for ways to grow business, manage operations more effectively and efficiently, and protect and secure one of their most important assets – information. Intel® Xeon® processor-based entry-level servers build in proven performance, manageability and reliability, allowing you to spend more time on moving your business forward.



Trust your company to Intel's proven server technology

With nearly 40 million Intel® processor-based servers shipped since 1996, and a 20-year track record of delivering enterprise-class performance, more companies trust their businesses to Intel processor-based servers. Intel processor-based entry-level servers give companies the reliability, performance, and tools they need to focus on their business instead of their computers.

Our entry-level server platforms are comprehensive solutions. We combine effective technologies, software, and industry alliances to give you servers optimized for your business with incredible value. Intel has used its new 45nm process technology to extend its Intel Core microarchitecture and provide compelling price performance for value conscious customers. You can count on Intel to deliver superior quality and reliability to drive your business forward.

The Ideal Entry-level Server

Our entry-level server platforms with quad- or dual-core processors and the Intel 3200 chipsets are ideal for value-conscious organizations looking for their first server or small HPC cluster with a close eye on their budget. These platforms offer industry-leading performance coupled with Intel reliability to help drive your big ideas non-stop, and are dependable, efficient to set up and manage, provide

trouble-free operation and help ensure that your operational needs are met at every stage of your business growth. Our entry-level server platforms integrate the most advanced technologies:

- Quad-Core Intel® Xeon® processor 3300¹ series or Dual-Core Intel Xeon processor 3100¹ series are based on Intel Core microarchitecture, with Intel® 64 Architecture² and 1333 MHz front-side bus. These processors deliver outstanding performance for today's business applications, capabilities to run a broad range of 32-bit and 64-bit applications, and plenty of headroom for growth for tomorrow.
- Power-efficient performance designed into the platform to help reduce operating costs while delivering higher performance than previous-generation Intel Pentium processor-based server platforms. Lower power consumption can also result in slower fans and quieter servers.
- Intel® Matrix Storage Technology quickly stores and retrieves data, while protecting one of your company's most important assets – information – with RAID 0, 1, 5, and 10 technology.
- PCI Express,* today's mainstream I/O technology, helps enable fast I/O transactions to assist peripherals to keep up with our high-performance processors and chipsets, and builds in scalability for the future. The Intel® 3210 chipset offers an additional PCI Express I/O for even more expansion possibilities.
- Intel® PRO/1000 PM/PL network connections provide gigabit Ethernet LAN connectivity for high-speed network access.
- Intel® Virtualization Technology³ provides hardware assist to virtualization software, enabling your servers to support both 32-bit and 64-bit operating systems and applications on the same server. Implementing virtualization enables businesses to get the most out of server investment by running more applications on each server.
- Up to 8 GB of high-speed 800 MHz dual-channel DDR2 memory with Intel 3200 chipset keeps more data closer to the processor and helps eliminate slowdowns from memory bottlenecks.

Protect Your Critical Data

Platforms based on the Intel 3200 chipsets support Error Correction Code (ECC) memory for a high level of data integrity, reliability, and system uptime. ECC can detect multiple-bit memory errors and locate and correct single-bit errors to keep business applications running smoothly. Intel Matrix Storage Technology with integrated RAID 0, 1, 5, or 10 accelerates data access to support high user productivity, and helps protect business operations by allowing recovery of data.

Intel Matrix Storage Technology is built into the Intel® 82801IR I/O controller hub (ICH9R). The ICH9R also supports both Serial ATA (SATA) at 3 GB/s with Native Command Queuing for high-speed disk access, and legacy parallel hard drive interfaces for versatility in a high-performance, entry-level server platform.

Cost-effective, Personal Supercomputing

Entry-level quad- or dual-core Intel server platforms are ideal for building small, cost-effective HPC clusters that create high-performance, personal supercomputing solutions, or workgroup clusters. 64-bit computing, up to 8 GB of high-speed DDR2 memory per processor, and gigabit Ethernet LAN connectivity enable rapid solutions of the large, complex problems found in technical computing.


Personal or workgroup clusters based on the Intel Xeon processor 3000 sequence offer an alternative for scientists and researchers who normally have to share supercomputer or large-scale computing power within a laboratory or a company. Personal or workgroup clusters allow scientists and researchers to be more productive by allowing them to complete tasks on a local cluster more efficiently and conveniently than on larger, shared, computer clusters. In addition to both convenience and productivity, scientists and researchers can gain performance capability to help process their applications or simulations at a fraction of the cost of a full-scale supercomputer.

These new platforms provide energy-efficient performance to help you get high-end performance for thin or thick nodes at low power levels, helping to keep the costs of running your personal cluster low. The Intel Xeon processor 3000 sequence-based servers give you essential server technologies to help improve your reliability and data protection. They can help you solve tough problems for less cost than traditional cluster technologies with the dependability and integrity of Intel's 20-year track record for delivering reliable, high-performance solutions.



Quad-Core and Dual-Core Intel® Xeon® Processor-based Platforms Overview

Platform Feature	User Benefit
Quad-Core Intel® Xeon® processor 3300 ¹ series	<ul style="list-style-type: none">▪ Based on Intel Core microarchitecture▪ 64-bit, quad-core computing with up to 12 MB on-die cache▪ 1333 MHz front-side bus
Dual-Core Intel® Xeon® processor 3100 ¹ series	<ul style="list-style-type: none">▪ Based on Intel Core microarchitecture▪ 64-bit computing▪ 1333 MHz front-side bus
Intel® Core™ microarchitecture	<ul style="list-style-type: none">▪ Better performance on multiple application types and user environments at a substantially reduced power envelope
1333 MHz front-side bus	<ul style="list-style-type: none">▪ Up to 10.6 GB/s with 1333 MHz
Dual-channel DDR2 memory with ECC	<ul style="list-style-type: none">▪ Up to 8 GB dual-channel DDR2 Error Correcting Code (ECC) memory with Intel® 3200 chipset that checks and corrects many common system memory errors
Intel® 64 Architecture ²	<ul style="list-style-type: none">▪ Enables extended memory addressability for server applications
Intel® Virtualization Technology ³ for directed I/O	<ul style="list-style-type: none">▪ Enables more operating systems and software to run in today's virtual environments▪ Developed with virtualization software providers to enable greater functionality and compatibility compared to non-hardware-assisted virtual environments▪ Intel® Virtualization Technology provides hardware assist to virtualization software, enabling your servers to support both 32-bit and 64-bit operating systems and applications on the same server. Implementing virtualization enables businesses to get the most out of server investment by running more applications on each server.
PCI Express* serial I/O	<ul style="list-style-type: none">▪ Industry-standard serial I/O capable of up to 4 GB/s peak bandwidth with x8 link with Intel 3200 chipset



Find out more about Quad-Core
Intel® Xeon® processors at
[www.intel.com/products/
processor/xeon](http://www.intel.com/products/processor/xeon)

What is the 3000 Sequence?

At Intel, our processor sequence numbers are intended to help clarify processor features, capabilities and intended usages. Intel offers four processor number sequences for server applications:

- **Quad-Core and Dual-Core Intel® Xeon® processor 3000 sequence:** One-processor servers for small business, entry, or first server based on the Intel Xeon processor
- **Quad-Core and Dual-Core Intel® Xeon® processor 5000 sequence:** Two-processor general-purpose, standard high-volume servers, HPC systems, and workstations based on the Intel Xeon processor
- **Quad-Core and Dual-Core Intel® Xeon® processor 7000 sequence:** Greater scalability with 4- to 32-processor enterprise servers based on the Intel Xeon processor.
- **Dual-Core Intel® Itanium® processor 9000 sequence:** Maximum performance and scalability for RISC replacement usage with 2- to 512-processor servers.

Quad-Core Intel® Xeon® Processor 3300 Series

Second-generation 45nm Quad-Core Intel Xeon processor 3300 series is based on Intel's enhanced core microarchitecture, integrates up to 12 MB L2 cache, Intel Virtualization Technology, and Intel 64 Architecture. Intel Xeon processor 3300 series provides significant performance headroom, especially for multi-threaded applications, helps boost system utilization through virtualization and application responsiveness.

Processor Number ¹	CPU Frequency	Cache Size ^a	Front Side Bus	TDP ^a	Intel® Virtualization Technology ³	Intel® 64 Architecture ²	Intel® EIST	Package
NEW Quad-Core Intel® Xeon® processor X3360	2.83 GHz	12 MB ^b	1333 MHz	95W	Yes	Yes	Yes	LGA775
NEW Quad-Core Intel® Xeon® processor X3350	2.66 GHz	12 MB ^b	1333 MHz	95W	Yes	Yes	Yes	LGA775
NEW Quad-Core Intel® Xeon® Processor X3320	2.5 GHz	6 MB ^c	1333 MHz	95W	Yes	Yes	Yes	LGA775
Quad-Core Intel® Xeon® Processor X3230	2.66 GHz	8 MB ^d	1066 MHz	95W	Yes	Yes	Yes	LGA775
Quad-Core Intel® Xeon® processor X3220	2.4 GHz	8 MB ^d	1066 MHz	95W	Yes	Yes	Yes	LGA775
Quad-Core Intel® Xeon® Processor X3210	2.13 GHz	8 MB ^d	1066 MHz	95W	Yes	Yes	Yes	LGA775

^aThermal Design Power

^bFeatures 6 MB Smart Cache per core pair

^cFeatures 3 MB Smart Cache per core pair

^dFeatures 4 MB Smart Cache per core pair

Dual-Core Intel® Xeon® Processor 3100 Series

Second-generation 45nm Dual-Core Intel Xeon processor 3100 series is based on Intel's enhanced core microarchitecture, integrates a 6 MB L2 cache, Intel Virtualization Technology, and Intel 64 Architecture. Economic, dependable Dual-Core Intel Xeon processor 3100 series-based servers deliver solid computing performance for entry-level servers without compromising affordability.

Processor Number ¹	CPU Frequency	Cache Size	Front-Side Bus	TDP ^a	Intel® Virtualization Technology ³	Intel® 64 Architecture ²	Intel® EIST	Package
NEW Dual-Core Intel® Xeon® Processor E3110	3.0 GHz	6 MB	1333 MHz	65W	Yes	Yes	Yes	LGA775
Dual-Core Intel® Xeon® Processor 3085	3.0 GHz	4 MB	1333 MHz	65W	Yes	Yes	Yes	LGA775
Dual-Core Intel® Xeon® Processor 3075	2.66 GHz	4 MB	1333 MHz	65W	Yes	Yes	Yes	LGA775
Dual-Core Intel® Xeon® Processor 3065	2.33 GHz	4 MB	1333 MHz	65W	Yes	Yes	Yes	LGA775

^aThermal Design Power

Breakthrough Performance with Enhanced Intel® Core™ Microarchitecture

Combining high-performance design with power-efficient technologies, the Intel Core microarchitecture is a foundation for new energy-efficient platforms. Intel Core microarchitecture technologies deliver higher performance/watt compared to previous Intel microarchitectures.

Intel® Wide Dynamic Execution. Executes more instructions per clock with as much as a 33 percent wider execution path for each processor core compared to previous Intel microarchitectures.

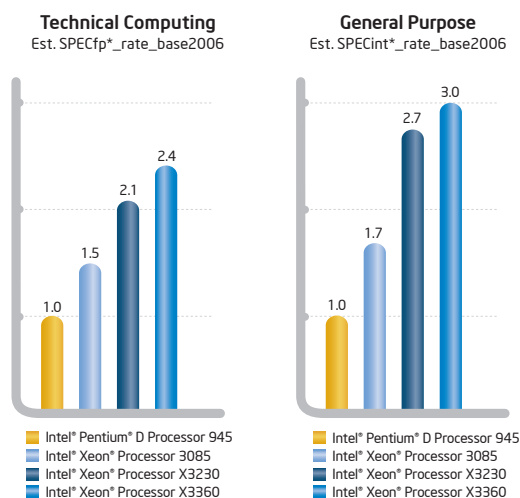
Intel® Intelligent Power Capability. Manages power consumption of all execution units in the core to help optimize energy usage.

Streaming SIMD Extensions 4 (SSE4). Provides building blocks for delivering expanded capabilities, enhanced performance, and greater energy efficiency for many applications.

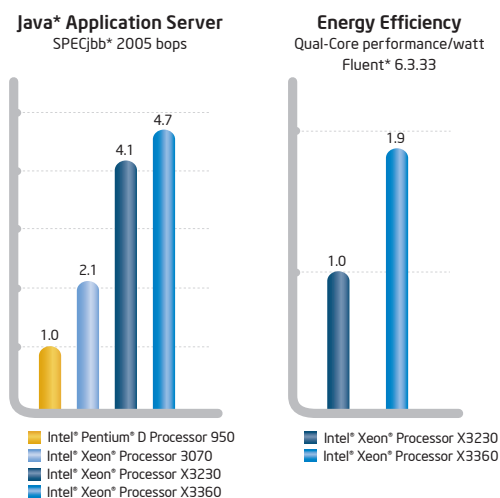
Intel® Advanced Smart Cache. A large on-die cache that reduces latency to data, helping to improve performance and power efficiency.

Intel® Advanced Digital Media Boost. Executes complete 128-bit instructions in one clock cycle instead of two cycles, as in previous microarchitectures, for improved performance of streaming instructions (SSE/SSE2/SSE3/SSE4). The enhanced Intel Core microarchitecture features a new Super Shuffle Engine, which improves existing SSE instructions while enabling significant gains on the latest SSE4 instruction set.

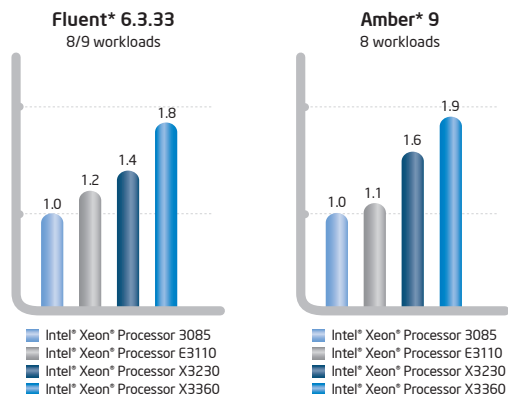
Compute-Intensive Throughput



General-Purpose Server



High-Performance Computing (HPC) Server



For more information on performance, please visit www.intel.com/performance

Server and HPC Performance

- **Benchmark Description for SPECcpu*2006 suite (SPECint*_rate_base2006 & SPECfp*_rate_base2006):** SPEC CPU2006 is the industry-adopted, CPU-intensive benchmark which stresses the system processor(s), memory subsystem, and compiler. Derived from 29 real user applications, CPU2006 provides a comparison across the widest practical range of hardware reporting a geometric mean ratio score on a baseline compiled binary.
- **Best 1-socket SPECfp*_rate_base2006 Intel internal measurement results as of January 7, 2008:**
 - Intel Pentium® D Processor platform (score 19.8): Fujitsu-Siemens PRIMERGY® RX100S4 server platform using one Intel Pentium D processor 945 3.40GHz, 4MB L2 cache, 800MHz bus, 8GB memory (4x2GB DDR2 PC4200E, 2-rank, CL4, ECC), 64-bit SuSE LINUX® Enterprise Server 10 2.6.16.21-08smp, Intel® C++ Compiler for IA32/EM64T version 9.1. Source: <http://www.spec.org/cpu2006/results/res2007q3/cpu2006-20070619-01288.html>.
 - Dual-Core Intel® Xeon® Processor 3085 platform (score 30.5): Dell® PowerEdge® R200 using Intel Xeon processor 3085 (3.00 GHz, 4 MB L2 cache, 1333 MHz bus), 8 GB (4x 2 GB DDR2-800), 64-bit SuSE® LINUX Enterprise Server 10, Intel® C++ and Fortran Compiler for LINUX32 and LINUX64 version 10.1. Source: <http://www.spec.org/cpu2006/results/res2007q4/cpu2006-20071210-02855.html>.
 - Quad-Core Intel® Xeon® Processor X3230 platform (score 42.2): Acer® Altos® G330Mk2 using Intel Xeon processor X3230 (2.66 GHz, 8 MB L2 cache, 1066 MHz bus), 8 GB (4x 2GB DDR2-800), 64-bit SuSE® LINUX Enterprise Server 10, Intel® C++ Compiler and Fortran Compiler for LINUX® version 10.1. Source: <http://www.spec.org/cpu2006/results/res2007q4/cpu2006-20071203-02758.html>.
 - 45nm Quad-Core Intel® Xeon® Processor X3360 platform (score 47.5): Intel 3210 Chipset-based internal server using Intel Xeon processor X3360 (2.83 GHz, 12 MB L2 cache, 1333 MHz bus, 45nm), 8 GB (4x 2 GB DDR2-800), 64-bit SuSE® LINUX Enterprise Server 10, Intel® C++ and Fortran Compiler for LINUX32 and LINUX64 version 10.1. Source: TR#842 as of 7 Jan 08.
- **Best 1-socket SPECint*_rate_base2006 published and Intel internal measurement results as of January 7, 2008.**
 - Intel Pentium® D Processor platform (score 20.6): Fujitsu-Siemens® Primergy® RX100S4 using Intel Pentium D processor 945 (3.40 GHz, 2x2 MB L2 cache, 800 MHz bus), 8 GB (4x 2 GB DDR2 PC4200E, 2-rank, CL4, ECC), 64-bit SuSE® LINUX Enterprise Server 10 2.6.16.21-08smp, Intel® C++ Compiler for IA32/EM64T version 9.1. Source: <http://www.spec.org/cpu2006/results/res2007q3/cpu2006-20070619-01287.html>.
 - Dual-Core Intel® Xeon® Processor 3085 platform (score 34.9): Dell® PowerEdge® R200 using Intel Xeon processor 3085 (3.00 GHz, 4 MB L2 cache, 1333 MHz bus), 8 GB (4x 2 GB DDR2-800), 64-bit SuSE® LINUX Enterprise Server 10, Intel® C++ Compiler for LINUX32 and LINUX64 version 10.1. Source: <http://www.spec.org/cpu2006/results/res2007q4/cpu2006-20071210-02852.html>.
 - Quad-Core Intel® Xeon® Processor X3230 platform (score 55.1): Acer® Altos® G330Mk2 using Intel Xeon processor X3230 (2.66 GHz, 8 MB L2 cache, 1066 MHz bus), 8 GB (4x 2GB DDR2-800), 64-bit SuSE® LINUX Enterprise Server 10, Intel® C++ Compiler for LINUX® version 10.1. Source: <http://www.spec.org/cpu2006/results/res2007q4/cpu2006-20071203-02759.html>.
 - 45nm Quad-Core Intel® Xeon® Processor X3360 platform (score 63.4): Intel 3210 Chipset-based internal server using Intel Xeon processor X3360 (2.83 GHz, 12 MB L2 cache, 1333 MHz bus, 45nm), 8 GB (4x 2 GB DDR2-800), 64-bit SuSE® LINUX Enterprise Server 10, Intel® C++ Compiler for LINUX32 and LINUX64 version 10.1. Source: TR#842 as of 7 Jan 08.
- **Benchmark Description for SPECjbb*2005:** SPEC Java Business Benchmark 2005 (jbb2005). Written in Java, this multi-threaded benchmark emulates an order processing environment in a company with multiple warehouses serving multiple customers. Measures average transaction throughput of a heavily loaded server. Performance reported in Business Operations per Second (BOPS).
- **Best 1-socket SPECjbb*2005 published and Intel internal measurement results as of January 7, 2008.**
 - Intel Pentium® D Processor platform (score 34,111 SPECjbb2005 bops): Fujitsu-Siemens® PRIMERGY® TX150S4 using Intel® Pentium® D Processor 950 (3.40 GHz, 800 MHz bus, 2x 2 MB L2 cache), 8192 MB RAM, Microsoft® Windows® Server 2003 Enterprise x64-Edition SP1 (64-bit), BEA® JRockit® P26.0.0-35-59328-1.5.0_06-20060321-1333-win-x86_64. Source: <http://www.spec.org/osg/jbb2005/results/res2006q2/jbb2005-20060425-00108.html>.
 - Dual-Core Intel® Xeon® Processor 3070 platform (score 70,971 SPECjbb2005 bops): Fujitsu-Siemens® PRIMERGY® RX100S4 using Intel Xeon processor 3070 (2.66 GHz, 4 MB L2 cache, 1066 MHz bus), 8 GB (4x 2 GB PC2-4200E CL4), Microsoft® Windows® Server 2003 Enterprise x64 Edition SP1 (64-bit), BEA JRockit® 5.0 P272.0. Source: <http://www.spec.org/osg/jbb2005/results/res2007q2/jbb2005-20070523-00318.html>.
 - Quad-Core Intel® Xeon® Processor X3230 platform (score 140,220 SPECjbb2005 bops): Dell® PowerEdge® R200 server using Intel Xeon Processor X3230 (2.66 GHz, 8 MB cache, 1066 MHz FSB), 8GB memory (4 x 2GB DDR2-800), BEA® JRockit® 6.0 P274.0. Source: <http://www.spec.org/osg/jbb2005/results/res2007q4/jbb2005-20071113-00419.html>.
 - Quad-Core Intel® Xeon® Processor X3360 platform (score 172,599 SPECjbb2005 bops): Intel 3210 Chipset-based internal server using Intel Xeon Processor X3360 (2.83 GHz, 12 MB cache, 1333 MHz FSB, 45nm), 8GB memory (4 x 2GB DDR2-800), BEA® JRockit® 6.0 P274.0. Source: Intel internally measured result TR#844.
- **Benchmark Description for Fluent®:** Fluent is a commercial engineering application used to model computational fluid dynamics. The benchmark consists of 9 standard workloads organized into small, medium and large models. These comparisons use all but the largest of the models which does not fit into the 8GB of memory available on the platforms. The Rating, the default Fluent metric, was used in calculating the ratio of the platforms by taking a geometric mean of the 8 workload ratings measured.
- **Best 1-socket Fluent® version 6.3.33 (8 of the 9 standard, jobs/day) benchmark results as of 7 Jan 2008:**
 - Intel® Xeon® Processor platform (3085 score 1611.1/avg sys watts 131; E3110 score 1874/avg sys watts 106.6; X3230 score 2294.3/avg sys watts 192.3; X3360 score 2976/avg sys watts 128.3): Intel 3210 Chipset-based server platform using Intel® Xeon® Processor 3085 (3.00 GHz, 4 MB cache, 1333 FSB), E3110 (3.00 GHz, 6 MB cache, 1333 FSB, 45nm), X3230 (2.66 GHz, 8 MB cache, 1066 FSB), or X3360 (2.83 GHz, 12 MB cache, 1333 FSB, 45nm), 4x 2 GB DDR2-800 ECC CL5 DIMMs, 120 GB SATA HDD, Red Hat® Enterprise LINUX 64-bit. Source: Intel internal measurements TR#823/844.
- **Benchmark Description for Amber®:** A package of molecular simulation programs. The workload measures the number of problems solved per day (PS) using eight standard molecular dynamic simulations. See <http://amber.ch.ic.ac.uk/amber9.bench1.html> for more information.
- **Best 1-socket Amber® version 9 (8 standard, PS/day) benchmark results as of 7 Jan 2008.**
 - Intel® Xeon® Processor platform (3085 score 305.5/avg sys watts 134; E3110 score 329.3/avg sys watts 109.5; X3230 score 461.4/avg sys watts 206.1; X3360 score 575.4/avg sys watts 139.8): Intel 3210 Chipset-based server platform using Intel® Xeon® Processor 3085 (3.00 GHz, 4 MB cache, 1333 FSB), E3110 (3.00 GHz, 6 MB cache, 1333 FSB, 45nm), X3230 (2.66 GHz, 8 MB cache, 1066 FSB), or X3360 (2.83 GHz, 12 MB cache, 1333 FSB, 45nm), 4x 2 GB DDR2-800 ECC CL5 DIMMs, 120 GB SATA HDD, Red Hat® Enterprise LINUX 64-bit. Source: Intel internal measurements TR#823/844.

SPECint*2006 and SPECfp*2006 benchmark tests reflect the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit or 64-bit applications. SPEC benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing. SPECcpu*2006 suite including SPECint2006 and SPECfp2006 are registered trademarks of the Standard Performance Evaluation Corporation (SPEC).



¹ Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor series, not across different processor sequences. See http://www.intel.com/products/processor_number for details.

² 64-bit computing on Intel architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers and applications enabled for Intel® 64 architecture. Performance will vary depending on your hardware and software configurations. Consult with your system vendor for more information.

³ Intel Virtualization Technology requires a computer system with a processor, chipset, BIOS, virtual machine monitor (VMM) and applications enabled for virtualization technology. Functionality, performance or other virtualization technology benefits will vary depending on hardware and software configurations. Virtualization technology-enabled BIOS and VMM applications are currently in development.

Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit www.intel.com/performance/resources/limits.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104.

All dates and products specified are for planning purposes only and are subject to change without notice.

Relative performance for each benchmark is calculated by taking the actual benchmark result for the first platform tested and assigning it a value of 1.0 as a baseline. Relative performance for the remaining platforms tested was calculated by dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms and assigning them a relative performance number that correlates with the performance improvements reported.

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